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METHOD FOR CONTROLLING GRAPHITIZATION DEGREE OF CARBON MATERIAL SURFACE LAYER AND METHOD FOR COATING MATERIAL SURFACE

Abstract:

PURPOSE: To improve the oxidation resistance of a carbon material and to prevent a film from being peeled off by a rapid heat cycle load by irradiating the surface of the carbon material with a high-energy beam, then converting the surface to silicon carbide by a diffusion reaction and further forming a silicon carbide film by chemical vapor deposition.

CONSTITUTION: The surface of a carbon material is irradiated in an atmosphere with the oxygen partial pressure controlled to 0.1-100Torr by a high-energy beam (e.g. a laser beam having $\geq 1\text{kw}$ and/or a plasma flame with the distance between the material and a plasma gun adjusted to $\leq 200\text{mm}$), then the surface of the material is converted to silicon carbide by diffusion reaction (e.g. the material is embedded in a ceramic powder contg. metallic silicon and allowed to react with the silicon for 30-300min), and further a silicon carbide film is formed by chemical vapor deposition (e.g. a gaseous mixture of carbon tetrachloride, methane, hydrogen and argon is subjected to reaction). Thus, the oxidation resistance of the carbon material is improved, and the film is not peeled off by a rapid heat cycle load.

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